THE USAGE OF DIGITAL TECHNOLOGY AND ITS EFFECT ON PHYSICAL ACTIVITY: AN EVIDENCE BASED REVIEW

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ABSTRACT

Physical inactivity is a public health concern that is considered a potential risk factor for adverse health effects worldwide. It is one of the leading causes of comorbidities, in adolescents at an early age. Increased levels of physical inactivity have negative impact on health systems, the environment, economic development, community wellbeing and quality of life. This evidence-based review is aimed to explore the prevalence of inactivity of adolescence using smart devices. **Methods:** *PubMed/Medline and Google Scholar data bases were searched by the authors to identify studies published from 2012 to 2021 covering adolescence using key search terms such as obesity, physical inactivity, Basal Metabolic Index, smart phone devices*. **Results:** *The findings from the related article show that the prevalence rate of physical activity among adolescence is high*. **Conclusion:** *The results of this review recommended the urgent need for members, organizations, policy makers, teachers and parents to implement measures that are made mandatory to reduce and prevent obesity and comorbidities among adolescence.*

Keywords: *Adolescence, Exercise, Overweight children, Physical activity, Screen time, Body Mass Index, Digital Technology*.

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INTRODUCTION

Globally 81 % of adolescents do not get enough of physical activity. As countries develop economically, levels of inactivity increases, and can be as high as 70 % due to changing transport patterns, increased use of technology for work and recreation, cultural values and increasing sedentary behavior's[1] Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure. Both moderate and vigorous – intensity physical activity improves health [2]. Physical activity refers to all movement. Popular ways to be active include walking, cycling, wheeling, sports, active recreation and play, and can be done at any level for skill and for enjoyment by everybody.

SEARCH STRATEGY

The author's browsed 100 articles PubMed/ Medline and Google Scholar data bases to identify studies published from 2012 – 2021 covering adolescence using key search terms such as obesity, comorbidities, physical inactivity and digital devices. An initial assessment of articles and abstracts were done for eligibility. Full articles were also screened if needed. Later a reassessment of the included articles was done, followed by extraction of the relevant data.

The following central questions were addressed in this review

1. What is the prevalence rate of physical inactivity among adolescence?
2. What are the causes and factors associated with physical inactivity?
3. What are the consequences of health due to lack of physical activity?
4. What are the study results and recommendation by the authors of the researches?

INCLUSION AND EXCLUSION CRITERIA

From the identified related articles, the inclusion and exclusion criteria were applied. Articles only published in English between 2012 – 2021 were screened and included. Studies focusing on prevalence and causes of physical inactivity were included. The inclusion criteria included the age of the children up to 18 years. Articles that were irrelevant to the scope of this review were excluded. Inaccessible full–text articles were also excluded. Articles related to adult physical inactivity were excluded. This resulted in articles, being included for this review from countries like India, Iran, Korea, Saudi Arabia, Germany, Brazil

PREVALENCE OF PHYSICAL INACTIVITY AMONG ADOLESCENCE

The prevalence of Overweight and Obese children in adolescents has increased throughout the world presenting a global crisis.[3] Although once considered to be a condition affecting high – income countries, rate of pediatric Overweight and Obesity have recently started to rise dramatically in some low and middle – income Countries.[4]. Evidence suggests that decreased level of physical activity is an important factor for the Prevalence of Childhood Obesity. [5]

A study conducted by the World Health Organization to describe the current prevalence and trends of insufficient physical activity among school–going aged 11–17 years by country, region and globally. Data was used from 298 school-based surveys from 146 countries, territories, and areas including 1·6 million students aged 11–17 years. Globally, in 2016, 81·0% (95% uncertainty interval 77·8–87·7) of students aged 11–17years insufficiently physically active (77·6% [76·1–80·4] of boys and 84·7% [83·0–88·2] of girls). Although prevalence of insufficient physical activity significantly decreased between 2001 and 2016 for boys (from 80·1% [78·3–81·6] in 2001), there was no significant change for girls (from 85·1% [83·1–88·0] in 2001). There was no clear pattern according to country income group: insufficient activity prevalence in 2016 was 84·9% (82·6–88·2) in low-income countries, 79·3% (77·2–87·5) in lower–middle-income countries, 83·9% (79·5–89·2) in upper–middle-income countries, and 79·4% (74·0–86·2) in high-income countries. The region with the highest prevalence of insufficient activity in 2016 was high-income Asia Pacific for both boys (89·0%, 62·8–92·2) and girls (95·6%, 73·7–97·9). The regions with the lowest prevalence were high-income western countries for boys (72·1%, 71·1–73·6), and south Asia for girls (77·5%, 72·8–89·3). In 2016, 27 countries had a prevalence of insufficient activity of 90% or more for girls, whereas this was the case for two countries for boys. [6]

A study conducted in Iran from Kurdistan, Fars, Markazi provinces in 2018 among adolescents aged 10 -12 years. Sample size of 1590 individuals was selected. The results showed that 25.79 % of the subjects were physically inactive and 7.30 % engaged in moderate physical activity during the week. The average physical activity during 1 week was more in boys than in girls. Adolescents of mothers with secondary and high school education were more likely to have physical inactivity than mothers with a high school diploma or higher. It also indicated a greater concentration of physical inactivity in adolescents with low socio-economic levels. [7]

THE CAUSES AND FACTORS ASSOCIATED WITH PHYSICAL ACTIVITY

Today's adolescents are less active than their peers decades ago. Watching television and computer games are known to be the main causes of physical inactivity in adolescents. There are also other factors in Iran, such as living in small houses and apartments, the phenomenon of single adolescent or the low number of adolescent in each family, lack of appropriate sports facilities in the community and schools, pressure of lesson plans for

high school students, preference of education than other aspects of life, disregard for sports at school and home and lack of security in the community that affect inactivity and lower activity of children and adolescents [7]

It has been hypothesized that a steady decline in physical activity among all age groups has heavily contributed to rising rates of obesity all around the world. Low participation in sports and physical education, among adolescent girls, are also associated with increased obesity prevalence. [8]

A Cross–Sectional observational study was conducted among 139 middle school aged children 11 – 13 years at the state of Tamil Nadu, India from June 2019 to August 2019. Data regarding screen time and physical activity were collected. The data was analyzed, majority of the students (52.5 %) had an average screen time of >=120 minutes followed by 61 to 120 minutes (28.8 %) and <= 60 minutes (18.7%). Only 31.7% followed the WHO recommendation of moderate to vigorous physical activity of at least 60 minutes per day. 57.5 % of the children had normal BMI, 10.8 % had thinness, 25.2 % were overweight and 6.5% were obese. Physical activity was found to decrease with increased Screen time. [9]

A study conducted in Korea among Chinese International students to examine the relationship and the impact of excessive Smart Phones use on physical activity. In this study, high–risk smart phone users showed less physical activity. Participants with smart phones addiction were less likely to walk for each day. The results of the study shows that smart phone use, may negatively influence physical health by reducing the amount of physical activity, such as walking, resulting in an increase of fat mass and a decrease of muscle mass associated with adverse health consequences. [10]

A study aimed to investigate the relationship between technology use and physical activity and to measure the associations between sociodemographic characteristics, technology use, and physical activity level among Saudi children. Children's Physical Activity Questionnaire, on the Impact of Technology on children was used to collect data. Data analysis revealed that high use of technology was significantly associated with low levels of physical activity. Ownership of a device was significantly associated with higher technology time consumption. [11]

A study on present trends in German's adolescent's television time, non–gaming PC use as well as Moderate–vigorous Physical activity from 2002–2010. Data were derived from the cross-sectional German Health Behaviour in School-aged Children (HBSC) study in 2002, 2006 and 2010. Analyses were based on 16,918 11-to 15-year olds boys (49.1%) and girls. Outcome variables were time spent in TV viewing and using a PC (weekday and weekend day) as well as the number of days achieving 60 minutes of MVPA. Changes in both screen-time behaviours and MVPA over time were analysed using sex-specific linear regression, controlling for age and family affluence. TV viewing on weekdays, but not at weekends, declined steadily over time with a difference between 2002 and 2010 of 12.4 min/day in girls and 18.3 min/day in boys (p for trend < .01). We found a strong increase in PC use for non-gaming purposes over time for girls only, with a difference between 2002 and 2010 of 54.1 min/weekday and 68.8 min/weekend day (p < .001). For MVPA we found a slight statistically significant increase in terms of meeting PA guidelines as well as days/week in MVPA for boys and girls (p < .001). In 2010 14.0% of girls and 19.9% of boys met PA guideline. Although increase in MVPA increased from 2002 – 2010 in German Adolescents, the time spent in MVPA was still low. Despite the observed decrease in TV viewing, there was no overall decline in the observed Screen–based behavior's, especially for girl. This is mainly due to a marked increase in use of a PC for chatting on–line, internet, emailing, home work. The findings highlight a need for strategies and interventions aimed at reducing the screen-time behaviors and promoting Moderate–Vigorous Physical Activity. [12]

A Cross–Sectional study was conducted in Brazil, among 270 students attending 5 Basic health care units. Physical activity and Screen time were assessed through a Questionnaire. The result shows that boys were likely; to be more active than the girls. The results showed an association between low PA levels and high amount of screen time among children and adolescents, showing that is necessary to encourage an active lifestyle, decreasing time spent on television, computers, cell phones, and video games. [13]

CONSEQUENCES OF HEALTH DUE TO LACK OF PHYSICAL INACTIVITY

Physical inactivity is the leading risk factor for mortality worldwide and contributes to the etiology and progression of non- communicable diseases, such as cardiovascular diseases, type–2 diabetes, various types of cancer, and chronic respiratory disease. Seventy one percent of all global deaths in 2016 were attributed to Non–Communicable diseases. In order to prevent and minimize the burden of NCDS, World Health Organization developed the Action Plan 2013 – 2020, with nine global targets, to be accomplished by the year 2025, one of the targets is to reduce physical inactivity worldwide by 10 %. However even in economically developed countries, level of physical inactivity, have increased in the past decades, as a result of Urbanization, digitalization, and varying options of transportation.[14]

Children who are overweight and obese also have more metabolic and cardiovascular risk factors such as high blood pressure, dyslipidemia, Type–2 diabetes, and other abnormalities of the cardiovascular system. [15]
Adolescence represents a critical period of development during which personal lifestyle choices and behavioral patterns are established, including the choice to be physically active. Physical inactivity, sedentary behaviour and low cardiorespiratory fitness are strong risk factors for the development of chronic diseases with resulting morbidity and mortality. [16]

RECOMMENDATIONS

The level of physical activity is a decisive component of adolescent health. A continued level of low Physical activity is related to cardiovascular and metabolic Problems. Physical activity is one of the behaviors that determine health status, as it plays a positive role in preventing morbidity and mortality in individuals. [17]
Currently a minimum of 60 minutes of moderate or Vigorous intensity of physical activity per day is recommended for adolescents, as set by the World Health Organization. [18]
The challenges associated with getting children and adolescents groups active every day, should be met with age–appropriate physical activity, enthusiastic leadership, family and friendly support. [19]

CONCLUSION

Community level interventions include advocacy to increase physical activity at schools and at home through the creation of environments that support physical activity. These efforts could include creation and maintenance of parks, inclusion of child friendly walking and bicycle paths as well as creating awareness about locally available physical activity options. At the physician's level it is essential to engage families with parental obesity or diabetes, because these children are at increased risk for developing obesity later in life. It is also essential to encourage an authoritarian parenting style and to discourage a restrictive one. Physicians should encourage parents to be role models when it comes to healthy diets, portion sizes, physical activity and screen time. Regular enquiries regarding diet and physical activity on routine visits will enhance awareness about the need for positive modification.

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